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THE ANNALS OF IRISH ZOOLOGY.

By the Editor.

(Concluded from p. 445.)

In the year 1744 a number of gentlemen in Ireland formed a society, known as "The Physico-Historical Society," with the object of investigating the Natural and Civil History of the several counties of Ireland, and raised funds by subscription "to employ proper persons to travel through the kingdom, to make observations and collect proper materials for the purpose." The labours of this Society began to bear immediate fruits: in the same year appeared 'The Ancient and Present State of the County of Down,' which, though bearing no author's name on the title-page, is usually attributed to Walter Harris; and this was followed, in 1746, by the 'Ancient and Present State of the County and City of Waterford,' by Dr. Charles Smith, who, in 1750 and 1756, published two similar works relating to the Counties of Cork and Kerry. Of that on Kerry, Macaulay wrote, "I do not know that I have ever met with a better book of the kind and of the size" (Hist. Eng. iii. p. 136), and all three of Dr. Smith's works were reprinted with additions in 1774. They have now become scarce and valuable.

To refer briefly to the first volume of the series, Harris's 'County of Down,' there is an account therein (p. 146) worth perusal of the pearl fishery which used to be carried on formerly on the River Bann, near Bann Bridge, the much-coveted mollusc being the Pearl-bearing Mussel, *Unio margaritifer*. The author says:—"The common method of fishing for these mussels in the Bann is very simple. In the warm months, while the river is low and clear, the poor people wade into the water, and some with their toes, some with wooden tongues, and others with sharp sticks, thrust into the opening of the shells, take them up. But this method can be practised only in shallow water; whereas the large mussels and the greater quantities are found in deep smooth water. If dredges or other mechanical contrivances were used to fish the deep waters in the Bann, they might probably meet with better success in the size, and it may be in the colour of the pearls." But he adds:—"The pearl-fishery in this river is of late not much pursued, few pearls being to be met with, and those in smooth deep water. Most that are found there now are not much larger than the head of a small pin, and of a dusky faint colour; yet a pearl has been within these few years taken near Bann Bridge of the size of a middling pea, but so muddy and full of specks that it was of little value."

Sir Hans Sloane had some of these pearls sent him, and said they were of the same sort with those of England and Lorrain, and probably differed little from the British pearls described by Tacitus as *subfusca ac liventia*—of a pale brownish colour.

In Chapter xviii. an account is given "Of the Feathered and Finny Tribes of this County." Amongst the more remarkable birds noticed are the Chough, sometimes seen in the neighbourhood of Killileagh, but "a stranger to the rest of Ireland except a few on the shores of Lough Earn in the County of Fermanagh, and (as we are informed) some in the County of Clare;" the Bittern, "frequenting quaggy marshes among bulrushes and reeds, and common in the lower Ardes and about Magherelin and other places"; the Water Ouzel, "a bird very common in this county, and to be found about many rivers near the mountains, and sometimes about rivers at several miles distant from them;" the Black-tailed and Bar-tailed Godwits and the Stone Curlew "often met with on the shores of this county, on Anahilt Bog, and about Killileagh." Assuming that no mistake was made in identifying the species, it is curious that a bird characterised a century later by Thompson as an extremely rare visitant to Ireland, should, in 1744, have been noted as common in the localities above mentioned.*

The Crossbill is noticed (p. 228) as a winter visitant. "They are not natives of this county; yet many of them were seen at Waringstown in the winter of 1707, of which Mr. Samuel Waring gives an account to Dr. Molyneux by letter that year, an extract of which is among Dr. Gilbert's collections in the College Library."

The Sheldrake is referred to (p. 230) as a resident, breeding in rabbit-burrows on the shores of this county, particularly about Killileagh, and the south of the barony of Lecale.

Great numbers of Wild Swans, it is said (p. 233), used to breed on the islands of Strangford Lough.†

The account which is given of the fishes, both marine and fresh-water, too long to be quoted here, deserves attention, especially the remarks on the Lake Trout and Pollan. Of the latter fish the author, after describing it, remarks:—"This fish was for a time supposed to be a peculiar inhabitant of Lough Neagh, but time has corrected that error, and it is now known that Lough Earn, in the Co. Fermanagh, has the same sort of fish, though not in so great plenty."

Chapter xix. (pp. 241—250) treats "of the Herring Fishery of this county in particular; and something in general of the decay of the Herring Fishery on all the coasts of Ireland; with some hints concerning the recovery and improvement of it."

In Smith's 'History of Waterford' (1746) we find some testimony to the decadence of certain species which were at one time numerous in Ireland. Thus of the Red-deer it is stated (p. 343):—"In the mountains of Knockmeledown we have some remains of the Red-deer, but so few that it is to be feared the species will in a few years be extinct, especially if a little more care be not taken of them."

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* It was reported also, in 1750, as occurring in the County of Cork in terms sufficiently clear. Dr. Smith, in his History of that county, writes (p. 345), "*Œdicnemus*, Stone Curlew: the feathers and feet resemble those of a Bustard, and its cry is something like that of a Green Plover (*C. pluvialis*). We have it on our shores."

† The names of these islands, with their respective areas, are given in a footnote, p. 153.

The Crane (which, in the time of Giraldus, was so numerous in Ireland that flocks of a hundred and more might often be seen) is included as a bird of passage with the remark that "during the great frost of 1739 some few Cranes were seen in this county, but not since, or before, in any person's memory."

In Smith's 'History of Cork' will be found a Catalogue of the Birds observed in this county (pp. 325—354). "For catching Larks," the author says, "the Hobby is let fly, and soars in the air above them; the Larks, spying their mortal enemy, lie flat on the ground, and so are easily taken in nets drawn over them. This sport is called 'daring of Larks.'" It is often mentioned by old writers, and is referred to by Shakespeare. The sport is doubtless of some antiquity; but it should be noted that Dr. Smith does not affirm that it was practised in the County of Cork, or indeed in any other part of Ireland, where, according to recent observation, the Hobby is an extremely rare bird. The Goshawk is included and described (p. 327), although, according to Thompson, it cannot with certainty be included in the Irish fauna.

The Common Brown Owl is also included (p. 328) as well known, feeding on mice, and in the evening destroying rabbits; although Thompson states that, if included at all in the Irish fauna, it must be considered extremely rare. Dr. Smith nevertheless distinguishes the sexes of this bird, describing one as brown, the other grey.

The Heath-cock, or Black-game or Grouse, *Tetrao, seu Urogallus minor*, is noticed as "frequent, and needs no particular description. It inhabits mountains, and is rarely seen in lower heath grounds. The cock is almost black, but the female is coloured like a Woodcock or Partridge." This description, as remarked by Thompson, would be decisive as to the species if taken from native birds, but it appears to be borrowed from Willughby.

Three species of Wild Pigeons are recorded as occurring in the County of Cork, including the Stock Dove, *C. œnas sive vinago*, although Thompson believed it to be unknown in Ireland. It is included by Dr. Rutty, however, in his 'Natural History of the County of Dublin,' to which work we shall have presently to refer, and of late years it has certainly been proved to be at least an occasional visitor to Ireland. Lord Clermont, for instance, has recorded its occurrence in the County of Down in October, 1875 (Zool. 1876, p. 4798). There is a specimen, too, in the Belfast Museum, which was shot also in the County of Down, and presented by Mr. A. O. D. Taylor, of Belfast, in 1876; and a young bird, shot after it had left the nest, was obtained by Mr. Darragh for the Belfast Museum.

In 'The Ancient and Present State of the Co. Kerry' we find but a brief chapter (Chapter xiii.) devoted to an account of the fauna, for the reasons thus stated in the opening paragraph:— "Having in some former volumes given a detail of the several species of fish and fowl that are to be met with in the southern parts of this kingdom; as this county is contiguous to those already described, it is frequented by almost the same kinds of both; therefore to avoid a repetition of what has been already treated of at large, I shall refer the reader to Chap. v. and vi. of the 4th book of the Natural History of Cork, as also to pages 259 and 335 of that of Waterford. All that I shall add here will be an account of some peculiar species not observed in the above-mentioned counties, with some curious particulars relative to their natural history, either new or not touched upon in the said tracts."

Then follow some brief remarks on the habits of the common Seal, the Cuttle, and common Crab, and a reference to the only bird which the author considers to be peculiar to the County of Kerry, which, from his description, appears to be the Storm Petrel, "an inhabitant of the Blasquet Islands."

Dr. John Rutty's 'Essay towards a Natural History of the County of Dublin' (2 vols., 8vo, 1772), may be said to mark a new era in the Annals of Irish Zoology by the methodical and systematic way in which his observations are recorded. The four chapters at the end of the first volume (pp. 263—392) deal respectively with the Quadrupeds, Birds, Fishes, and Insects, which at the date of publication were regarded as indigenous to the County of Dublin, and contain several passages worth noting.

"The Stag, Hart, or Red-deer is found here, although much rarer than the *Cervus platyceros*, the Buck, or Fallow-deer, whose horns are palmated."

It would have been desirable to know in what particular parts of the County of Dublin the Red-deer was to be found in Dr. Rutty's day, and whether in a wild state or only in parks.

"A vulgar error," he says, "has prevailed, mentioned in Johnson's 'Historia Animalium,' that the Dormouse is not found in Ireland, nor could live in houses built of Irish oak, which is equally fabulous with what is related concerning the antipathy of the Viper to Irish wood" (p. 277). But Dr. Rutty by no means disproves Johnson's statement, nor adduces any evidence of the existence of the Dormouse in Ireland.

"The Martern, or Marteron, *vulgo* Martin, is found at Lutterelstown. It destroys rabbits and poultry, and is almost as mischievous as the fox" (p. 281). The Weasel is included with the remark, "It may be very useful, as it kills rats and mice better than cats do" (p. 283); but as the Stoat is omitted, and no sufficient description of the animal called Weasel is given, it is possible that the Stoat may be the species referred to.

"The Frog was brought into this kingdom A.D. 1699 by Dr. Guithers" (p. 290).

"The Squirrel is said to have been found in the wood at Lutterelstown. The skins dressed with the hair are much valued as furs for their warmth and fineness of their touch" (p. 291). "The Badger, Gray, Brock, or Bawson," is mentioned as a native of the county (p. 291). Only one species of Bat is included (p. 293), and that not identified. In all probability the Common Pipistrelle.

The Birds of Ireland having been so thoroughly dealt with in the well-known work of Thompson, who naturally availed himself of Dr. Rutty's labours, so far as seemed to him desirable, little need be said here by way of comment. Attention, however, may be directed to a few species which are included by Dr. Rutty as found in the County of Dublin, and yet by no means generally admitted to be indigenous to Ireland. Of these may be named the Black Grouse (p. 302), Red-legged Partridge (p. 303), and the Stock Dove (p. 305).

The Magpie, which, according to Giraldus, as above noted, was in his day said to be unknown in Ireland, is included by Dr. Rutty amongst the Birds of the County of Dublin (p. 308), but with this remark:—"It is a foreigner, naturalised here since the latter end of King James the Second's reign, and is said to have been driven hither by a strong wind."

A noticeable feature in this catalogue of birds is that in almost every instance the food of each species is specified. Four folding plates are given, on which are figured (1) the Ringed Plover and Snow Bunting, (2) the Whitethroat, (3) the Widgeon and Easterling, (4) the Little Grebe.

From the description given, the Easterling of this author is apparently the Gadwall, and if so, it is remarkable that this bird should be found so far to the westward as the County of Dublin. Thompson, who considers it a rare species in Ireland, does not notice this passage.

The account which follows of the Fishes is equally methodical, if not quite so accurate, but it appears to be derived in a great measure from the Histories of Down, Cork, Kerry, and Waterford, already noticed.

In the Appendix to a 'Statistical Survey of the County of Down,' by the Rev. John Dubourdieu, 8vo, Dublin, 1802, will be found (p. 312) "Some Notice respecting the Natural History, ancient as well as modern, of this County." It extends, however, to only half-a-dozen pages, and, with the exception of some remarks on the fossil horn of the Great Irish-deer, appears to have been chiefly compiled from Harris's 'History of Down,' before noticed.

'A Statistical Survey of the Co. Antrim,' by the same author (Dubourdieu), published in two parts, 8vo, Dublin, 1812, contains, in the first part, a section (pp. 113—126) on the Fishes of Lough Neagh, including the first definite notice of a charr-like fish in Ireland. This fish, there called the Whiting, is identified as *Salmo alpinus*, but as, in the opinion of Dr. Günther, the description does not give any specific characters, we are left in doubt as to the correctness of the determination. It is probable that the Whiting of Lough Neagh is now extinct.*

Another section (pp. 126—128), relates to "the Birds which either live about Lough Neagh, or frequent it in their passage."

The "Grosbeak (*Loxia*)," therein mentioned as being "like a green Linnet but larger," and "often resorting to the wooded farms in its neighbourhood in winter," is most likely not the Hawfinch, but the Crossbill. "The Jay," it is said, "was much more frequent before the woods at Portmore were cut: it is still, however, to be met with about Shane's Castle, and other woods at the borders of the lake." "Pheasants were formerly numerous at Portmore; now, I believe, they only exist at Shane's Castle and its immediate vicinity." "Wild Turkeys are now nearly extinct, though once in such numbers at the former place; the breed the true copper-colour, with red legs."

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* *Cf.* Günther, 'On British Charrs,' P. Z. S., 1862, p. 42.

It seems to have been formerly the fashion to introduce and preserve Wild Turkeys for the sport of shooting them.*

The next work on our list is M'Skimin's 'History and Antiquities of the County and Town of Carrickfergus,' 12mo, Belfast, 1811. In the Appendix to this little volume will be found (pp. 173—183) a "List of fish found in the Bay of Carrickfergus," together with lists also of the Crustacea and Mollusca. At pp. 196—203, we find a "Catalogue of the most remarkable Birds observed within the County of Carrickfergus." In this Catalogue the Magpie and the Partridge, which were stated by older authors to be unknown in Ireland, are here noted as common.

In the more important quarto of the Rev. George Sampson, entitled 'A Memoir explanatory of the Chart and Survey of the County of Londonderry,' 1814, we find "A Catalogue of some of the Birds observed in Londonderry" (pp. 171—177), amongst which the Kite is noted as "frequently seen hovering over poultry." The Brown or Tawny Owl, considered by Thompson as extremely rare in Ireland, is characterised as commoner than the White Owl. The Magpie is said to be "very common and destructive to young poultry, eggs, &c. Imported from England not one hundred years, now a common nuisance, and instead of being solitary, is becoming gregarious." The Partridge also, at this date, is said to be "common and well known."

The most remarkable statement in this Catalogue, perhaps, is that which refers to the Great Auk:—"*Alca impennis*, Pinguin; on steep rocks sometimes; more frequent near Hornhead, in Donegal County." The author does not explain how a bird which is *impennis* contrives to surmount steep rocks, and his statement reminds us of the equally curious one made by Temminck concerning this same bird, which he asserted retired to breed "upon the banks of Newfoundland," or, in other words, under water![*] The "Pinguin" referred to is in all probability either the Razorbill or the Guillemot; notwithstanding that the author, at the end of his list, remarks, "There are doubtless many other birds. I mention only such as I have myself observed"—seventy-eight species in all.

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* See Gilpin's 'Forest Scenery,' vol. ii., p. 74; and Jesse's 'Gleanings in Nat. Hist.,' 1st series, p. 147.

Of the "Fishes observed on the Coast and in the Rivers of the County of Londonderry," a systematic list of nearly fifty species is given (pp. 178—181), with observations, as in the case of the birds, and a figure of the Opah, or King-fish (*Lampris luna*) is given as "the only fish of this species which has been known to be taken on the Irish coasts."

"Among the quadrupeds which formerly existed, but are now extinct (says the author), is the native Stag or Red-deer. The moose-deer is only claimable to these regions by the discovery of his horns in our bogs;[†] the wolf is happily no more; and even the fox is gradually withdrawing from the haunts of man and his vigilant satellite the dog. Neither have we moles, serpents, nor toads, but the frog, who not one hundred years ago was (with the Magpie) imported in a luckless hour, has, like his fellow-voyager, multiplied exceedingly to our discomfort. The otter is yet discoverable, though not common: the marten still more rare; the weazel is frequent, but here, as elsewhere, leaves it doubtful whether he is to be ranked with the workers of good or evil. Had his antipathy to the Norway rat been more active he might have preserved the black natives, now almost, if not entirely, extinct. With the mischievous domestic mouse, and the inoffensive shrew-mouse, I may close this catalogue of our natural and adopted quadrupeds."

The information here given respecting the fauna of Londonderry is much the same as will be found in the 'Statistical Survey' of that county, published by the same author in 1802.

Of the limited number of works relating to the fauna of Ireland which have been published during the last forty years, it will suffice to mention only the titles, since they are doubtless sufficiently well known. Taking them in the order of publication we have :—

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[*] It would perhaps be more correct to characterise this statement as "*attributed* to Temminck," since we have been unable to verify it.

[†] A fine pair of horns of the true Elk (*Alces*), discovered at Dardistown, near Drogheda, Co. Meath, are described and figured by Dr. Molyneux in 'Boate's Natural History of Ireland.' Others found in the Co. Tyrone were described by Thompson, P.Z.S., 1837, p. 53.

1845. Harvey, J. R. Contributions towards a Fauna and Flora of the County of Cork, read at the meeting of the British Association held at Cork in the year 1843. The Vertebrata by J. R, Harvey; the Mollusca, Crustacea, and Echinodermata by J. D. Humphreys; the Flora by Dr. Power. 1 vol., 8vo. Cork and London.

1846. Richardson, H. D. Facts concerning the Natural History of the gigantic Irish Deer. 8vo. Dublin.

1849—56. Thompson, W. The Natural History of Ireland. Vols. I.—III., Birds. Vols. IV., Mammalia, Reptiles, Fishes, and Invertebrata. 8vo. London.

1853. Watters, J. The Natural History of the Birds of Ireland, Indigenous and Migratory. Post 8vo. Dublin.

1880. Patterson, R. L. The Birds, Fishes, and Cetacea commonly frequenting Belfast Lough. 8vo. London and Belfast.

To give a complete list of the various papers relating to Irish zoology, which may be found scattered throughout the pages of scientific journals, need not here be attempted. It will suffice for our present purpose if we indicate the names of the journals in which they may be found. These are :—

The Transactions of the Royal Irish Academy. 4to. Dublin. 1787 to date.
Proceedings of the Royal Irish Academy. 8vo. Dublin. 1837 to date.
Journal of the Geological Society of Dublin.
Journal of the Royal Geological Society of Ireland.
Proceedings of the Natural History Society of Dublin.
Proceedings, Dublin University Zoological and Botanical Association.
Journal of the Royal Dublin Society.
Proceedings of the Belfast Natural History and Philosophical Society.
Loudon's Magazine of Natural History.
Magazine of Zoology and Botany.
Annals of Natural History.
Tho Zoologist.

Doubtless there are other periodicals in which papers relating to the fauna of Ireland may be found, and it is almost superfluous to name the Transactions and Proceedings of the Royal, Linnean, and Zoological Societies, which would of course be consulted by any one seeking information on such a subject.

It will be gathered from the foregoing remarks that there are comparatively few works of real value relating to the fauna of Ireland, by far the greater number of those which we have mentioned being more curious than useful.

In searching for reliable information on any point connected with Irish zoology, most people would probably content themselves with referring to the works of Harvey, Thompson, Watters, and Patterson, and to the various papers by Sir James Wilde, Prof. M'Coy, Dr. Carte, Dr. Ball, Dr. Scouler, Prof. Leith Adams, Messrs. A. G. More, Warren, Barrington, Freke, and other good observers in Ireland which have been published in the various scientific periodicals above named. But something more than this is required. The standard work of Thompson, published a quarter of a century ago, now stands in need of revision and emendation; while most of the scattered papers to which we have referred may be said to be practically inaccessible to most people. A reference to them at least is attended with considerable trouble and inconvenience. We stand sadly in need of a good modern comprehensive work on the fauna of Ireland, and one cannot doubt that the appearance of such a work would be hailed with satisfaction by the large and ever-increasing body of British zoologists.

The question is one which, as it seems to us, might well be dealt with by the British Association. Considering the success which attended the efforts of the Irish Physico-Historical Society made in the same cause more than a century ago, with slender means and far fewer facilities than now exist for the prosecution for scientific research, it cannot be doubted that a far greater success would be achieved at the present day if some scheme for the investigation of the fauna of Ireland were carried out under the auspices of the British Association for the Advancement of Science. It would not be difficult to appoint for the purpose a committee of specialists, and place a fund at their disposal for three years. In that time it would be possible to collect and arrange materials for a practically exhaustive work on Irish Zoology—a work which, as we have said, is much needed; would redound greatly to the credit of the British Association; and relieve British naturalists of the reproach under which they remain of knowing less of the natural productions of their own country than they do of those of the antipodes. This suggestion is respectfully offered for the consideration of those whom it may concern.

ORNITHOLOGICAL NOTES FROM EAST NORFOLK.

By J. H. Gurney, Jun., F.Z.S.

In his "Notes on the Food of Birds," my friend Mr. Norgate, referring to the larder of the Red-backed Shrike, notices four species of bumble-bee which he has found impaled by this bird. To these I am able to add two more. We have this year been fortunate enough to have two pairs of Red-backed Shrikes at Northrepps, and each pair had two nests. I was very anxious to find their "larder" as soon as I heard of them, and the search has been carried on with great zeal. Fourteen bees were found, from the largest "bumble" down to *Bombus elegans*. These were kindly identified for me by Mr. J. B. Bridgman, of Norwich, as *B. subterraneus*, *B. leucorum*, *B. virginalis*, *B. elegans*, *B. hortorum*, and *B. lapidarius*—all females. Mr. Bridgman does not think this shows any partiality in the Shrike for female bees, except that the females being heavier and slower flyers are consequently more easy to capture. It is worthy of remark that both Mr. Norgate's specimens and mine were all identified as females. The bees were nearly all stuck upon dead thorns, such as are used to mend weak places in a hedge; whereas a Shrew-mouse and a young Yellowhammer were impaled on the wild plum or sloe-bush, and so firmly rammed down that the thorns projected through their bodies more than an inch. It is curious how little I can find on the subject of the Red-backed Shrike's larder in our works on Ornithology. I had always supposed that when a spot had been chosen all the prey was impaled there. But this is not the case; the Shrike will garnish a hedge a quarter of a mile from its nest, and not be constant to the same spot for two days, as I have found in the case of the nests in this parish.

On June 17th Mr. Norgate and I found a Greater Spotted Woodpecker's nest, containing young, in a birch tree on the edge of a sheet of water known as Bluestone. The trunk of the tree, and of several neighbouring trees, was covered with scratches made by the claws of the Woodpeckers, for the most part parallel lines of various lengths, from two to four in number. I afterwards found several birch trees scratched and lined in the same way by the Green Woodpecker at Northrepps. The pond at Bluestone is a great asylum for the Reed Warbler, and as the reeds are not very high in the middle of June, I found without much difficulty six nests, and a few days afterwards Mr. Norgate, going again by himself, found eight; and all this in a compass of half an acre. To any one who does not mind wading, the Reed Warbler's is the easiest of nests to find, and I suppose for that reason it is selected by the Cuckoo to lay its egg in. On one occasion a young Cuckoo was seen by Mr. Norgate being fed by a Thrush near the reeds at Bluestone, and which had doubtless been hatched by Reed Warblers, and flown away from its foster-parents. I believe that instances of this kind frequently happen. Is it as well known that the young Cuckoo sometimes puts itself into the most extraordinary passion, darting at everything that approaches the nest of which it is the occupant? A young Cuckoo at Sprowston, the occupant of a Pied Wagtail's nest, behaved in the most ferocious manner, and we could not conjecture the motive. Our adult Cuckoos were as usual the first of migratory birds to leave us; many young ones generally remain late, and when strong on wing are mistaken for Sparrowhawks.

I found a nest of the Teal in the spring at Hempstead; and, with reference to Mr. Hewett's note on the subject of the lining, I may remark that the old birds had employed down almost entirely, and certainly I did not see any feathers. It was a beautiful structure, deposited in the snuggest way in a bed of heather, slightly arched over with the common fern, and an aperture left for egress. The hen bird sat like a stone, and we almost trod on her. We almost always have one nest there, but I believe never more. Ducks and Teal remain longer at Hempstead than they do at the Broads; and the 1st of August, when our close-time ends, is not too late for the "flappers" at Hempstead.

We had a decided migratory arrival of Sparrowhawks in the middle of August. One dashed itself against a window, attracted by a Canary, and three or four were often seen in a day, where it is rare to see one at any other time. The Northrepps gamekeeper took four in about a week in a very ingenious net, which I recommend to any one who does not wish guns to be fired near the Pheasants' coops. It is quite a small affair, about six feet broad, hung up lightly in a path or "drive" in the wood. Whatever comes in contact with it brings it down directly, and although a few unfortunate Cuckoos and other birds are occasionally caught, yet as they are always found alive they can be set at liberty. To show how small an aperture a Sparrowhawk can get through, I will just mention that I took a young male out of this net, and with great difficulty squeezed it into the "boot" of a dogcart through a space exactly two inches and a half wide, meaning when I got home to pinion it and turn it out in the kitchen-garden, but it was out and gone in a second. I should not have thought it possible it could have escaped through so small an opening; but since one of them forced its way into a certain bantam-house at Northrepps I have believed these birds can get through anything.

A short time ago, when fishing on one of our Broads, I was witness of a fight between a Marsh Harrier and some Herons. It began by the Marsh Harrier mobbing a Heron: at this juncture eleven other Herons appeared on the scene, and the Harrier beat a retreat, while the Heron it had been hunting did the same, with outstretched neck and in a great fright still. I should be curious to know if the Herons were really a reinforcement to their brother in difficulties.

I saw a Peregrine Falcon flying over Norwich on September 15th. An adult Common Buzzard was taken on a post-trap at Northrepps on September 27th, and being not much hurt was put in a cage and is doing well.

A migration of Buzzards occurred at Yarmouth the third week in September, and most of them were obtained in very curious ways. Mr. A. Patterson writes to the 'Eastern Daily Press,' under date of September 24th:—"A striking fatality has overtaken many birds of the raptorial genus, evidently migratory birds *en route* for this country. Slipping on to the beach this morning I was surprised to find here and there the carcasses of several of these; opposite the Aquarium I picked up three dead Sparrowhawks. In the crop of one I found the eye, pieces of flesh, and a few small feathers of a little bird; the others were empty. A Sparrowhawk was picked up exhausted in Row 51; it was stunned from striking a lamp in that yard. This was on Thursday evening at about nine o'clock. Farther north of the Aquarium I observed three Common Buzzards, a Razorbill, and a headless mangled carcass of a bird which I concluded to be a Marsh Harrier." Another Buzzard was caught alive in the town and taken to Mr. G. Smith on the 24th, who thinks it struck the light on the Sailors' Home. Besides these Mr. Lown, the bird-stuffer, told me he had received or heard of seven others.

That some of these birds were the Honey Buzzard is likely enough, for we have had a migration of them also. It is impossible, without seeing them, to be sure of correct identification in every case; but there have been seventeen Honey Buzzards, for certain. As previous experience would lead us to expect, the two other species having been plentiful, not a single Rough-legged Buzzard occurred. The Honey Buzzards seem generally to have been trapped at wasps' nests. One taken alive at Southrepps which was thus caught had, in the process of demolishing the wasps' nest, scooped out a hole big enough for it to get into. The man who took it told my father it came back to the hole seven or eight times before he thought of putting a trap down. Another was described to me by a keeper as rising from a wasps' nest, which had the appearance as if a dog had been scraping at it. On going to look at the place a few days afterwards I found the Buzzard had been again, and made a hole nearly a foot in diameter, revealing all one side of the wasps' nest. The keeper believed it had been every morning, as he had watched the hole getting bigger and seen the Buzzard near it. We refrained from the temptation of putting a trap down. The scale-like feathers between the eye and the beak are an excellent protection from wasp-stings and a good mark of distinction between this species and the other Buzzards. We have three of these Honey Buzzards alive, and I look forward with much interest to watching the gradual change in their plumage; they are all very different at present. I have not heard that this arrival of Honey Buzzards has yielded one of the beautiful white varieties occasionally got, of which two Norfolk specimens are figured in the first volume of 'The Zoologist' (1843, p. 377), nor a single ash-cheeked adult.

I have been two or three times lately to Breydon "broad,' near Yarmouth, and have seen and heard of several birds there, the chief of which have been a Sandwich Tern, three Kentish Plovers, one Temminck's Stint, two Red-necked Phalaropes, and three young Gadwalls. These last I did not see, but I believe there was no doubt about them: they were very tame, and were with an old drake which escaped. The man who shot them sold them to a poulterer named Thomas at the price of ordinary Wild Ducks, and as such they were hung up in his shop, but some of the Yarmouth naturalists found out what they were. On the 29th a drake in change was shot at Buckenham, which I saw before it was skinned. There is an element of doubt about all these Gadwalls, as Lord Walsingham and Mr. Fountaine keep a stock in West Norfolk, the produce of tame birds, which are now thoroughly established and able to take care of themselves.

On September 6th I shot five Little Stints out of a flock of about twice that number on the Breydon broad, and some young Pigmy Curlews, which appear at this particular season to be equally common with Dunlins, from which they are easily recognised at a great distance by their slightly larger size. A young Red-necked Phalarope, now in my collection, had been shot on the 4th, which, considering that five shots were fired at it, was not as much spoilt as might have been expected. It was taken to Mr. Lown, the birdstuffer, who had another in, shot at Hopton, near Yarmouth, on the 30th.

On the 24th a Grey-lag Goose was shot by a boatman named Gibbs, and others are reported by Mr. Smith as brought to him on the same day. I saw six Wild Geese flying over Sprowston on the 22nd, and thought it early for them. On the 26th I shot a Greenshank. I may here mention a Smew, in my possession, killed on the Broad on the 15th January, which has partially, but by no means entirely, assumed the white garb of an adult. An adult female was killed with it (ascertained to be so by dissection), which has black cheeks, which used, before the subject was worked out, to be supposed to be the mark of a young male. Another female killed four days later, and sexed by dissection, has no black at all on the cheek, and is no doubt the younger bird of the two.

OCCASIONAL NOTES.

Iceland Falcon in Ireland.—Of the two Gyrfalcons, the Greenlander (*F. candicans*, J. F. Gmel.) has several times been captured in Ireland, and we have in this Museum the very specimen which was killed many years ago at Belmullet, Co. Mayo, as already noticed by my friend Mr. Warren in 'The Zoologist' for 1877, p. 234. But the scarce Icelander (*F. islandus*, J. F. Gmel.) is only very dubiously included by Thompson, and is altogether omitted as an Irish bird by Watters, and in Prof. Newton's edition of Yarrell. I have therefore much pleasure in placing upon record, as Irish, an indubitable specimen of the Iceland Falcon, which belongs to Mr. Henry J. Richards, of Barnagh, Belmullet, and was shot, as Mr. Richards informs me, by his brother-in-law, in September, 1879, at Tarmoncarra, three miles from the town of Belmullet. The bird was sent to Dublin at the time, and set up by Mr. Williams, to whom I feel much indebted for the information, and I am still more obliged to Mr. Richards, who was kind enough to send his bird for examination, and to allow it to remain as a loan in this Museum. It is remarkable that both species of Falcon should have occurred in the same neighbourhood, and I may add that my friend Capt. Boxer, of the Irish Lights Office, tells me that of late years he has heard of more than one large white Falcon occurring on the north-west coast of Mayo.—A. G. MORE (Museum of Science and Art, Dublin).

ORNITHOLOGICAL NOTES FROM SALISBURY.—On the 1st May, 1879, I noticed a full-plumaged Pied Flycatcher, a male bird, on my garden-gate. It was wonderfully tame, and I could easily have procured it, as it was about the Vicarage garden and grounds most of the day. It moved on, however, and I saw no more of it. Its black and white plumage is so striking that the most unobservant person could scarcely see one without noticing it. On February 21st or 22nd, 1881, I saw a fine Great Grey Shrike in an orchard close to the house, between here and Salisbury. I was attracted first by the peculiar motion of its long tail, and as it was the first time I had seen one in its wild state I was much pleased. I watched it for some time, and was within a few yards of it, so that I could observe its actions perfectly. I tried to obtain this bird, but could not hear of it again in the neighbourhood. A nice specimen of each, of the Short-horned Owl and Brambling, were picked up dead in the latter part of last winter, after the heavy snow, and were brought to me. The Brambling was a male bird in good plumage; the Owl was also in good plumage, but very thin. The other day a friend of mine shot and brought to me a very peculiarly marked Jackdaw. It was, however, in full moult, and so, most unfortunately, unfit for preservation. The entire bird would have been of a delicate light silver-grey colour, the new quills being of that tint, while the older plumage was greyish mouse-colour. I had noticed the bird about the Vicarage during the last two years.—A. P. MORRES (Britford Vicarage, Salisbury).

HABITS OF THE STORM PETREL IN CAPTIVITY.—During the recent gale (October 14th) a Storm Petrel was picked up alive at Cardiff, and taken to Mr. Drane, of Queen Street, who succeeded in keeping it alive for a week, when it died. I send you an account of the bird which he wrote for the 'Cardiff Western Mail' of November 1st:—"I received it in a condition of extreme exhaustion, and thought it could not survive the day. It was placed in a box containing about seven pounds of hot sand covered with some folds of a soft woollen stuff, and fed at frequent intervals with morsels of fish dipped in cod-liver oil, cod-liver oil alone, brandy and milk, cream, chewed bread and butter, bits of beef-fat, and raw meat. It would submit to be forcibly fed with solids, but rejected liquids with apparent aversion, and revived considerably; so that it would seek for food, and take it from the hand. It never appeared at all wild, timid, or spiteful, was exceedingly fond of warmth, would nestle in the hollow of the hand, settle itself to sleep there, and remain quiet as long as permitted to do so. When allowed its liberty in the room, it would flitter about the floor for a time, with a singular gracefulness, but would ultimately settle as near the warm fender as it could get, twice got within it, and seemed very happy there. Placed in a large bath, it showed an entire incapacity to use its feet for swimming like other web-footed birds, and its plumage, like theirs, instead of repelling water, became saturated at once. Its feet never moved in concert--expanding and closing, as a duck's would do, but, on the other hand, it was evidently distressed, and not in its element. When removed from the water it was so wet, even its wings, that it was quite helpless. I was so surprised at this that, a few days afterwards, I repeated the experiment, that I might not be misled by too hasty a conclusion. The result was the same, and my observations so confirmed as to lead me to the conviction that these birds never take the water like ducks, gulls, grebes, &c., and that being forced into it by accident they would be quite unable to extricate themselves, and would perish as certainly as any land bird. I have no opportunity of speaking upon actual measurement, but should say its gape is not larger than the common Martin's, but it was capable of a dilation sufficient to enable it to swallow with ease pieces which would strike one as very much too large for it. As it seemed to dislike liquids, I soon discontinued my attempts to feed it with them, except oil; and twice, long afterwards, I saw it forcibly eject a watery fluid, free from grease, from its nostrils, as if from a syringe, though the quantity was not more than a small drop. Does this justify the conjecture that watery liquids are so little necessary to its economy that it is provided with this faculty in order to rid itself of any superfluity? It has a habit of climbing by its hooked bill and wings, using the wrist, or carpal joints with the effect of hands; the feet are used at the same time, but play a subsidiary part. When at liberty in the room, to interpose an impediment to its progress was to excite a determination in this way to surmount it, when, with a tenth of the effort, it could have gone round it. Its habits were distinctly nocturnal, beginning to be lively in the evening and remaining restless all night; whereas it would be quiet or sleep the greater part of the day, especially if near the fire or on hot sand. It did not once utter any sound, and I never saw it put its head under its wing in sleep. It tucks its feet up in its feathers, just as a swan does when sleeping afloat, and, lying then close to the ground, rests the tip of its bill upon it, straight in front. It would flitter about the room in a manner suggesting a child's first efforts to walk, carrying its wings extended and erect over its back, so as to assist its progress, just as if it was not sure of its feet, or not quite accustomed to their use. This elegant movement shows how it would *tread* the surface of the water, in its search for floating food, while its wings supported it sufficiently to prevent immersion."—MURRAY A. MATHEW (Stone Hall, Haverfordwest).

PETRELS ON THE LINCOLNSHIRE COAST.—Three specimens of the Fork-tailed Petrel, *Thalassidroma leucorrhoa*, were caught on the night of October 24th in flight nets on the salt-marshes near Friskney, and sent to me in the flesh—two females and one male. At the same time a pair of Storm Petrels, *T. pelagica*, were taken in the same manner. This locality is rather remarkable for the occurrence of the Fork-tailed Petrel, for I have on previous occasions received others from there, and heard on good authority of its occasional appearance there. I have myself seen the bird flying over the sea-banks there after an exceptionally stormy night, and I should attribute the appearance of the subjects of this notice to a similar cause. Mr. Dresser, in his 'Birds of Europe,' mentions the west coast of England as being most frequently visited by this species; but as far as my experience goes, the coasts of Lincolnshire and Norfolk have furnished a much longer list of specimens taken.—CHARLES DIXON (Tenterden Street, W.).

RARE BIRDS IN SUSSEX.—During the month of September, and early part of October, two Little Stints, *Tringa minuta*, and two Curlew Sandpipers, *T. subarquata*, were shot in the Pevensey marshes; another *T. minuta* and three *T. subarquata* were obtained near Rye. On Sept. 27th a Common Buzzard, *Buteo vulgaris*, was brought for preservation to Mr. Bristow, of St. Leonards-on-Sea; it had been shot the day before at "The Grove," Hollington, not more than half a mile from the town. Mr. W. B. Young, on whose property it was shot, informed me that another was seen the next day, and a week or so afterwards three more were seen. I see Mr. Harting, in his 'Handbook of British Birds,' referring to this species says, "Migrates to the east and south-east in autumn." About ten days ago I saw at Messrs. Pratt's, Brighton, a fine dark-plumage male Honey Buzzard, *Pernis apivorus*, which had been shot by Mr. H. Langton, and taken there for preservation. [This bird was killed in Hertfordshire; see p. 472.] Mr. Pratt also informed me that another dark-plumaged female af this species was caught at Robertsbridge on October 2nd; and another one was taken at Balcombe a few days before; this latter was a male, and had been feeding on wild bees and their larvæ, its throat being full of them. Another *P. apivorus* was obtained at Birch Grove, near East Grinstead, and was sent to Mr. Max, taxidermist, of that town, for preservation; the bird when first seen was apparently digging for a wasp's nest; a trap was set by the gamekeeper, and the bird was secured. A Great Grey Shrike, *Lanius excubitor*, was caught at Patcham, near Brighton, on October 15th, and was brought alive to Mr. Pratt, who also received a few days afterwards a fine specimen of the Crested Lark, *Alauda cristata* [recorded by Mr. Borrer, p. 494], and on October 25th, a mature specimen of the Lapland Bunting, *Emberiza lapponica*. Mr. C. J. Ebden, of Coghurst Hall, near Hastings, informs me that towards the latter end of October he flushed a Great Snipe, *Gallinago major*, in a stubble-field on the Coghurst Hall estate. On the last day but one of October, when shooting in the Walling Marsh, near Rye, in company with Mr. H. V. Chapman, I was told by that gentleman that on the 16th of the same month, when out for a walk in the marsh with his setter, he flushed a Heron from a dyke, and the bird, instead of making off, as is usual, flew round and round his dog, repeatedly striking at its head; the bird, he further added, seemed devoid of all fear, and followed himself and dog for some little distance, frequently coming within a few yards of where he was. Strange conduct, surely, in a bird usually so wild and wary as the Heron; and at this time of the year anxiety for its young could certainly not be pleaded as an excuse for its audacity.—Thomas Parkin (Halton, Hastings). [Not unprecedented. See 'Hints on Shore Shooting,' p. 67.—Ed.]

Song of the Woodchat Shrike.—On the 1st of November I first heard the song of the Woodchat Shrike, as uttered by a caged male bird in my possession. The servants, who keep him by the kitchen fire, reported on October 24th or 25th that he was then singing loudly, and continued to report the fact daily until on November 1st I myself heard his well-sustained melody. It is for the most part guttural, but contains some very sweet notes. He has not heard any other bird singing since I purchased him in August last at Geneva. About August 12th he commenced to moult, now three parts completed. His sister nestling died in September without having cast a feather. Her voice did not possess the harsh chuckle or alarm-note of her brother; but rather resembled the wail of a kitten in difficulties, especially if she was hungry, or saw a grasshopper. It may be worth adding that the throat of the Woodchat vibrates very visibly during the performance of the song. At present the bird sings about four times a-day, warbling on each occasion for some minutes. He often holds up beetles in his feet, using those extremities almost as hands.—Hugh A. Macpherson (Westbourne Terrace, W.).

Birds and Telegraph-wires.—Mr. Corbin's note on this subject brings to remembrance a few instances which have come within my own experience from time to time. Although there is no doubt that migratory birds suffer most from coming in contact with these obstructions, yet resident species are frequently killed or wounded by flying against them. A few years ago a single telegraph-wire was stretched across the sand-hills to the lighthouse at Spurn, and numbers of *Tringidæ* and other shore-birds came to an untimely end by flying against it; but after the first year or so the number of casualties was very considerably lessened, thus showing that the birds get accustomed to these impediments in course of time and avoid them. I have seen a Turnstone that had one wing completely severed from the body, and have heard of other somewhat similar instances. On one occasion, whilst driving along the Leeds and Wetherby turnpike, a Wood Pigeon flew across the road at a place where it passes through a wood in which these birds nest, and, hitting the telegraph-wires, fell dead by the roadside, and I picked it up; but beyond a few feathers which had been knocked off, the bird showed no trace of the accident. A farmer one day flushed a covey of Partridges, and they flew into the wires, and he secured three of them. I also picked up a Thrush on the same road. About a year ago, when driving into Scotland over Shap Fells by the old coaching road, I noticed that when we reached the summit of the moor, the telegraph-wires, instead of being stretched from post to post in the usual manner, were run in pipes under-ground for a considerable distance. On arriving at the hotel at Shap I was told that this had been done on account of the havoc which the wires when exposed had caused amongst the Grouse. Several other cases of both migratory and non-migratory birds, not having come under my own observation, I will not relate. They were cases of Partridge, Corn Crake, and Woodcock.—J. J. ARMISTEAD (Douglas Hall, Dalbeattie, N.B.).

OSPREY IN CORNWALL.—On October 6th Mr. Pendarves, of Pendarves, near Camborne, shot an Osprey near his ponds. The bird had been observed by him and his keepers for a day or two previously; and an Osprey (probably the same bird) had just before that been seen by Mr. F. V. Hill, of Helston, at Clewance Ponds, about two miles from Pendarves. The specimen, which is a young bird in excellent plumage, is now with Mr. W. H. Vingoe, of this place, for preservation. Mr. Vingoe informs me that on two occasions previously he has observed an Osprey in Mount's Bay; and I myself, some twenty-five years ago, observed a large bird on the surface struggling with something in the water,—probably a fish too powerful for it,—and running my boat down upon it thought it to be an Osprey, but it flew away before I got within shot of it. The struggle took place in water about eight fathoms deep.—THOMAS CORNISH (Penzance).

HOBBY NESTING IN OXFORDSHIRE.—I am glad to be able to record that the Hobby, with us a very rare summer visitant, has twice nested near here of late years. My brother, Mr. O. V. Aplin, has in his possession an egg taken from a nest at Claydon in 1876, and in 1877 he received a young bird which had been taken from a nest in some high trees near Huscote Mill. He kept this bird alive for nearly a year and a half, when it died, probably from the effect of exposure to the severe cold. When in captivity it showed a decided preference for the internal organs of freshly-killed birds.—F. C. APLIN (Bodicote, Banbury).

CRESTED LARK IN SUSSEX.—On the 10th October a specimen of this bird was caught by a Brighton birdcatcher, at Portslade, a few miles to the west of that town, and taken to Messrs. Pratt, the birdstuffers, where I saw it in the flesh the next day. It is in very perfect plumage, and proved on dissection to be an adult male. It is now in my collection, and as I believe only five specimens are recorded as having occurred in this country, I have thought it worthy of notice.—WILLIAM BORRER (Cowfold, Sussex).

[Seven instances of the occurrence of the Crested Lark in England and Ireland are recorded in the 'Handbook of British Birds' (p. 110), and we are informed by the Rev. Murray A. Mathew that a bird of this species, shot on Braunton Burrows, N. Devon, about the autumn of 1855, is preserved at Tapley Park.—ED.]

JACKDAW *versus* CHOUGH IN KIRKCUDBRIGHTSHIRE.—The Jackdaw is a very common bird, breeding along our sea-coast in considerable numbers. I have authentic instances of the Chough formerly breeding at several stations on our cliffs, but it is now, I fear, quite extinct here. I have never myself seen one, but have met with old inhabitants who remember the "red-legs" very well, and tell me there were formerly plenty of them. Jackdaws have increased in numbers here, and have, I believe, driven the Choughs away; the latter have certainly not been driven away by man. It would be interesting to know if the same has occurred elsewhere. Last spring we had a *pied* Jackdaw, one wing being nearly all white. The bird frequented a sea-cliff within a quarter of a mile of my residence, and I had a good opportunity of watching it all through the season. It paired and bred, but the young were of the usual colour, and at moulting time the white feathers of the adult bird were replaced by black ones.—J. J. ARMISTEAD (Douglas Hall, Dalbeattie, N.B.).

[This return to the normal coloration after the moult confirms the view expressed on cream-coloured varieties (p. 468).—ED.]

GLOSSY IBIS IN HAMPSHIRE.—The specimen of this bird, referred to in your editorial note (p. 469) as having been killed in Hampshire, was shot at Dogmersfield Park, on the 15th September last, by one of Sir H. Mildmay's keepers.—RICHARD HOOPER (Upton Rectory, Didcot).

EARLY APPEARANCE OF THE GREAT GREY SHRIKE.—A specimen of the Great Grey Shrike, *Lanius excubitor*, was shot at Friskney by one of the coast-guard during the first week of October, and is now, I believe, in the possession of Mr. Hutchinson, of Derby.—Chas. Dixon (Tenterden Street, W.).

Honey Buzzard in Hertfordshire.—As an interesting coincidence in connection with the notice (p. 472) of a Honey Buzzard being shot in this county, I may mention that a bird of this species was killed on the same day in this parish, which is about six miles distant from where the previous bird was met with.—J. A. Ewing (Westwick Rectory, Herts).

NOTICES OF NEW BOOKS.

The Formation of Vegetable Mould through the action of Worms; with Observations on their Habits. By Charles Darwin, LL.D., F.R.S. Post 8vo, pp. 313. London: Murray. 1881.

The perusal of a paper "On the Formation of Mould," published by Mr. Darwin many years ago in the 'Transactions of the Geological Society,' has in some measure prepared us for the volume just issued, which may be regarded as an expansion of the former essay. Objections having been taken by continental naturalists to some of the statements put forth by Mr. Darwin in his earlier *brochure*, he resolved to make more observations of the same kind as those he had published, and to carry out some experiments, with a view to ascertain the degree of intelligence possessed by earthworms.

By many people these lowly organised creatures are regarded as too insignificant to be worth notice, and few probably have taken sufficient interest in them to examine their structure and investigate their habits.

The body of an earthworm consists externally of a series of rings, from one hundred to two hundred in number, each having short bristles projecting from it. These rings are well seen in the remains of a worm that has been dried by exposure to the sun and air, when they retain their annular shape, and form a hollow tube. They are connected by a membrane or skin, and are moved by strong muscles contained in their interior. The fore part of the body is tapering, and ends in a mouth with lips. Immediately behind the mouth is the gullet or tube leading to the gizzard; this swells out into a strong muscular throat or pharynx. On each side of the gullet are glands secreting lime. The gullet itself ends in a crop, which leads into a powerful gizzard: this, like the corresponding organ in a bird, contains stones for grinding the food. These stones in a full-sized worm are so large that nine or ten of them laid side by side will measure a full inch. The intestine passes straight from the gizzard to the end of the body. Worms have no lungs, breathing by their moist skin; hence they rapidly perish when exposed to dry air, though capable of prolonged life under water. Their senses are peculiar. They have no eyes, yet appear sensitive to light, which must pass through the transparent skin to reach the nerves. Thus they distinguish day and night, and avoid the dangers of exposure to their enemies, the birds, during the former period. Sound, unless accompanied by vibration of the ground, produces no effect on them, but they are sensitive of the slightest touch, even of a current of air. Their food is chiefly half-decayed leaves, but they are also carnivorous, and even prey upon the dead bodies of their own kind. The dead leaves they drag into their burrows, partly for food, and partly to close the openings. The leaves are seized by the lips, and then the anterior part of the body is formed into a kind of sucker. When leaves are not to be obtained for food, they swallow large quantities of mould, digesting the vegetable matter, and voiding the mineral portion in the form of worm-casts at the mouths of the burrows.

In plugging up the mouths of their burrows, they evince a remarkable degree of intelligence. In order to test this, Mr. Darwin scattered a few hundred elongated triangles of paper over the ground, after removing all the fallen leaves he could see. These triangles, cut out of writing-paper, were rubbed with raw fat on both sides to prevent their becoming too limp when exposed at night to rain and dew. He found that, in the majority of cases, the worm on seizing a triangle selected the most pointed angle to draw into its burrow; in other words, it seized it in the position in which it could most easily be made to effect the object in view. In considering the question whether such action is intelligent or non-intelligent, Mr. Darwin adopts the argument that we can safely infer intelligence only when we see an individual profiting by its own individual experience; and he adds that if worms are able to judge either before or after having drawn an object close to the mouths of their burrows, how best to drag it in, they must acquire some notion of its general shape, and thus guide their actions by the result of individual experience.

The enormous amount of earth brought annually to the surface by worms is very remarkable. By actual experiment—that is, by collecting and weighing the castings—it appears that in some cases 83 lbs. of earth are brought up to the surface of every square yard during the year—an amount which reaches the high total of 18 tons per acre; and 10 tons may be taken as a very fair average. The number of worms in an acre of land has been estimated at between 50,000 and 60,000, their weight being nearly 400 lbs. The numerous experiments of this kind made by Mr. Darwin give some very curious and at the same time astonishing results. One of these experiments lasted about thirty years! It was this:—In 1842 a layer of broken chalk was spread over old pasture land for the sake of observing at some future time the depth to which it would become buried. In 1871 a trench was dug across the field, and the line of white masses was everywhere seven inches from the surface!

After such experiments as these, it is not difficult to understand how boulders, monoliths, and ancient monuments, may in course of time become gradually buried by the agency of earthworms, to whom antiquaries may be said to be truly indebted. The tesselated pavement of Abinger, in Surrey, was covered with at least fourteen inches of worm castings; the remains of a Roman villa at Chedworth, in Gloucestershire, were concealed under thirty-eight inches of similar soil; and the fine villa recently discovered at Brading, in the Isle of Wight, had been buried by worms to the depth of from three to four feet, the floor having gradually sunk as the earth which the annelids piled up was removed by them. In like manner the Roman towns of Silchester, in Hampshire, and Wroxeter, in Shropshire, have experienced the kindly attention of the worms; while one of the fallen blocks at Stonehenge has sunk considerably below the level of the surrounding ground through the same agency.

It must not, however, be forgotten—and Mr. Darwin is careful to remind us of this cause of possible error in his own calculations—that the washing down of soil from the neighbouring higher lands and the deposition of dust have together aided largely in the work of concealment when the ruins are so placed as to permit of the action of these subsidiary causes.

The assistance which worms lend to the process of denudation is of special importance in the case of flat or gently inclined surfaces, for here it is not improbably the chief agent at work. Castings thrown up during or shortly before rain flow for a short distance down an inclined surface, and the finest earth is washed completely away. Again, during dry weather the disintegrated castings roll as little pellets, and, even on a level field, a strong wind will blow them all to leeward.

In his closing chapter, Mr. Darwin thus summarises the chief benefits confirmed by worms on man as a tiller of the soil. ' Worms," he says, " prepare the ground in an excellent manner for the growth of fibrous-rooted plants and for seedlings of all kinds. They periodically expose the mould to the air, and sift it, so that no stones larger than the particles which they can swallow are left in it. They mingle the whole intimately together, like a gardener who prepares fine soil for his choicest plants. In this state it is well fitted to retain moisture and to absorb all soluble substances, as well as for the process of nitrification. The bones of dead animals, the harder parts of insects, the shells of land-mollusks, leaves, twigs, &c., are before long all buried beneath the accumulated castings of worms, and are thus brought in a more or less decayed state within reach of the roots of plants. Worms likewise drag an infinite number of dead leaves and other parts of plants into their burrows, partly for the sake of plugging them up and partly as food. The leaves which are dragged into the burrows as food, after being torn into the finest shreds, partially digested, and saturated with the intestinal and urinary secretions, are commingled with much earth. This earth forms the dark-coloured, rich humus, which almost everywhere covers the surface of the land with a fairly well-defined layer or mantle. When we behold a wide, turf-covered expanse, we should remember that its smoothness, on which so much of its beauty depends, is mainly due to all the inequalities having been slowly levelled by worms. It is a marvellous reflection that the whole of the superficial mould over any such expanse has passed, and will again pass, every few years through the bodies of worms."

In the face of such testimony as that adduced by Mr. Darwin's untiring industry in this extremely interesting volume, it may well be doubted whether there are many other animals which have played so important a part in the history of the world as "the poor worm."

Studies in the Theory of Descent. By Dr. A. WEISMANN. Translated and edited by RAPHAEL MELDOLA, F.C.S. Part II. On the origin of the Markings of Caterpillars, and on Phyletic Parallelism in Metamorphic Species. With six coloured plates. 8vo. London: Sampson Low & Co. 1881.

IN the first portion of this work, which is announced to be completed in three parts, Dr. Weismann examined the phenomena of seasonal dimorphism in butterflies; in the second part now before us we have two essays with the titles given above. Of these, the former embodies the details of a careful study of the change of markings which the caterpillars of the *Sphingidæ* undergo in the course of their development. From a consideration of these, the author deduces certain laws of development, which are subject to modification through the influence of natural selection, and the necessity for protection, thus giving rise to the various markings observable in different groups. These varieties of colour and markings in the *Sphingidæ*, according to Dr. Weismann, have a distinct biological value, and can in every case be traced to the action of natural selection and correlation of growth.

In his second essay, the author compares different groups of *Sphingidæ* in their three stages of larva, pupa, and imago, and argues that the modifications which are found to occur are due, not to any innate law of variation and development (which would affect all the stages *pari passu*, and produce "a phyletic parallelism" which does not exist), but to an adaptation to special conditions to which, in one or other of its stages, the insect is exposed. This is stated to be the case not only with Lepidoptera generally, but with all creatures which undergo a metamorphosis.

No one but an entomologist well conversant with German would have ventured on a translation of this very interesting work, for the numerous technical terms which everywhere occur require a translator who has not only a knowledge of the language, but a really thorough acquaintance with the subject matter of the work. English readers, therefore, who do not, like Mr. Meldola, possess these qualifications, will feel grateful to him for so reliable and well illustrated an edition.

The Spiders of Dorset; with an Appendix containing short Descriptions of those British Species not yet found in Dorsetshire. By the Rev. OCTAVIUS PICKARD CAMBRIDGE, M.A., C.M.Z.S. Edited by Professor JAMES BUCKMAN, F.G.S., F.L.S. Vol. II. 8vo, pp. 236—625. Sherborne: L. H. Ruegg. 1881.

ALTHOUGH professedly dealing only with the Spiders which have been met with in the county in which the author resides, this is in fact a monograph of the British *Arachnidæ;* for about two-thirds of the known British species have been found in Dorsetshire, and the remaining species are now included in an Appendix to the second and concluding part of the work lately issued. We have thus a very complete handbook to the study of a subject which has hitherto had but few votaries, but to which many more doubtless will now turn their attention.

In our notice of the first volume of this work (Zool. 1879, p. 470), we directed attention to the excellent Introduction which it contains, in which the author, after pointing out the difference between Spiders and Insects, describes their external and internal structure, their habits and economy, their snares and mode of entrapping their prey. In the second volume we find some "additional remarks on the senses, habits, and economy of Spiders," in which the general reader will find more to interest him than he will in the scientific diagnoses of species, which occupy the bulk of the work.

"Spiders," says Mr. Cambridge, "undoubtedly possess the sense of sight in a very strong degree; but within what limits of distance, or with what magnifying power, we have very little proof, either from observation or anatomy. It is probable that many Spiders see best with a diminished light, and different powers of vision are attributed to the different eyes, although this has not been as yet completely proved."

The sense of touch, or feeling, is no doubt much assisted by the hairy armature of the legs, palpi, or other parts. Mr. Cambridge thinks it is also probably through these hairs that the sense of hearing is principally exercised. It is certain that Spiders are very sensibly affected by sound, though whether they are capable of appreciating and discriminating musical sounds, as has been asserted, is more doubtful.

They have most probably a strong sense of taste, which is without doubt seated in the tongue.

With respect to the sense of pain, there seems no reason to believe that Spiders are more susceptible than any others of the *Articulata*, in all of which any sense of acute pain is probably almost or altogether wanting.

Mr. Cambridge has some interesting observations on the power to utter sounds possessed by at least one British species, *Asagena phalerata*, the only one, so far as he is aware, in which this peculiarity has been noticed, although a stridulating apparatus has also been found in a large Indian Spider, *Mygale stridulans*, Wood-Mason.

From the foregoing remarks it will be seen that 'The Spiders of Dorset' is not a mere dry list of species, with technical diagnoses, but contains, in addition to necessary descriptions, much information that will be interesting, not only to those who have made Spiders their special study, but to that larger class of naturalists who, for want of a text-book like that now supplied by Mr. Cambridge, are perhaps as yet imperfectly informed on the subject.

Some more Scraps about Birds. By CHARLES MURRAY ADAMSON. 8vo, pp. 273, with illustrations. Newcastle-on-Tyne: Bell & Co. 1881.

THIS volume may be regarded as a second series of the Notes and Observations on Birds, which, under a somewhat similar title, appeared in 1879, and were noticed in 'The Zoologist' for that year (p. 391). Many of these notes are interesting enough, embracing as they do the results of the author's personal observation of the habits of wildfowl and waders on the shores and estuaries of Northumberland during the past forty years, and his remarks on the seasonal change of plumage which these birds undergo are well worth perusing. But the reader is placed at serious disadvantage owing to the form in which these notes are presented to him. They appear, for the most part, to be *verbatim* transcripts from the author's journals, printed as they were written, without any order or arrangement, save the chronological order in which they were originally jotted down, and without an index of any kind.

The author tells us in his Preface that "having so many memoranda, and in such various forms, I was quite at a loss in what shape to put them, even for my own reference; I therefore resolved to print them as they turned up, and my inability to arrange them must be my excuse for the unsatisfactory way in which they appear." We cannot admit the validity of such an excuse. On the contrary, bearing in mind the maxim that "what is worth doing at all is worth doing well," we think that Mr. Adamson should have taken the trouble (for that is really what it amounts to) of collecting all his notes upon each species under the head of that species, instead of leaving them scattered throughout the volume; the species might then have been grouped under certain general headings, and a good index would have rendered the volume far more complete and useful than it now is.

It is to be regretted that Mr. Adamson has not adopted some such course as this, for many of his notes are of practical value, and would be useful for future reference if the reader were only enabled to find them again without having to look through the entire volume a second time.

A noticeable and meritorious feature in the book is the number of lithographic illustrations (about forty) with which it is interspersed, from original sketches by the author. Some of these are very characteristic of the species they are intended to represent, and betoken close observation of the attitudes and actions of wildfowl and seafowl as studied in their natural haunts.

A Manual of Injurious Insects; with Methods of Prevention and Remedy for their attacks on Food Crops, Forest Trees, and Fruit. With a short Introduction to Entomology. By ELEANOR A. ORMEROD. Post 8vo, pp. 316, with numerous illustrations. London: Sonnenschein & Allen. 1881.

THE object of this volume is to give a short account of the different kinds of insects, about ninety in number, which attack wheat and root crops, fruit, and forest trees in this country, and to furnish suggestions for the prevention or remedy for these attacks. Such a manual was much needed, and, written as it is in a plain unaffected style, will commend itself to the most unlearned.

The descriptions of the insects and their habits are briefly and clearly detailed, accompanied in almost every instance by a figure, either from original drawings by the author or reproduced by permission from Curtis's well-known 'Farm Insects.' These illustrations, in many cases pourtray the insect in its successive stages of larva, pupa, and imago, as well as the appearance presented by its peculiar mode of attack.

The remedies suggested are all based upon experiments made and communicated by trustworthy observers, or taken from previously published information duly acknowledged.

Miss Ormerod has been fortunate in securing the co-operation of numerous well-known entomologists in various parts of the country, who have freely contributed the results of their own observations and experiments *pro bono publico*, and the result is a very useful little Manual.

We will make one suggestion for improvement in a second edition. Two Introductions and a Preface strike us as being rather *de trop*. It would surely be better to let the Preface follow and form part of Introduction No. 1, retaining the title of "Preface" only; and let this be succeeded by the "Introduction to Entomology," the first seven pages of which might be condensed with advantage. Some of the illustrations are good, but many of them are not delicate enough, and would be much improved by the application of less ink and pressure. There is room for some improvement, too, in the Index. As the book is intended chiefly for the use of those who are not professed entomologists, it would be desirable that the Index should in every case contain the common English name as well as the scientific name. We do not find the Yellow Underwing Moth under any of these three English words, nor is it included even under the generic term *Tryphæna*, although described and figured at p. 38, as well as being figured also at p. xxxi of the Introduction.

Ought not the larvæ of *Tenebrio molitor*, popularly known as "meal-worms," to find place amongst "Injurious Insects"?—for injurious they certainly are to flour stores. These larvæ swarm in all places where flour and meal are kept, and often do great damage to biscuits, especially those which are taken to sea.

A Zoological Atlas (*including Comparative Anatomy*); *with Practical Directions and Explanatory Text. For the use of Students.* 249 coloured figures and diagrams. By D. M'Alpine, F.C.S., Lecturer on Biology and Natural History, Edinburgh. (*Invertebrata.*) Edinburgh and London: W. & A. K. Johnston. 1881.

The first part of this Atlas, containing the *Vertebrata* has already been noticed in 'The Zoologist' (*anteà* p. 392). The second part just published deals with the *Invertebrata*, and contains carefully drawn figures of the external and internal structure. This is so much more varied than is the case with the Vertebrates, that the number of typical forms is necessarily much greater. To keep the size of the work within due limits the author has been obliged to make a selection, and has given a preference to such genera as are required for the Practical Examination of the University of London. In that examination not only has the candidate to dissect specimens placed before him, but also to examine and describe *prepared* specimens, and the first four plates in this Atlas may be regarded as preliminary exercise in seeing and describing. They are introduced to show how the lower forms may be studied, and how by the use of what the author calls "Life-History Diagnoses" the student may take in at a glance the chief features of their life.

As regards the explanatory text, the brief introductory description of the animal usually gives those characters which are best observed in the living state, and which show its relations to its surroundings, while the remainder of the text describes the figures, dealing with the various parts of the animal in detail. The clearness with which these details have been drawn renders the Atlas on the whole a useful aid to practical anatomy.

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CONTENTS.

On the Habits and Migration of the Snow Bunting, *John Cordeaux* (with Plate by Mr. Charles Whymper), 1.

The Past and Present Distribution of some of the Rarer Animals of Scotland:—I. The Wild Cat, *J. A. Harvie Brown, F.Z.S.*, 8.

OCCASIONAL NOTES.

Mammalia.—The Beaver in Norway, 23. White-beaked Dolphin in the Firth of Forth, 23.

Birds.—Ornithological Notes from North Northamptonshire, *Right Hon. Lord Lilford*, 24. Ivory Gull, Hoopoe, &c., at Redcar, *T. H. Nelson*, 25. Autumn Migration of Birds on the East Coast, *F. Kerry*, 26. Glossy Ibis in Aberdeenshire, *G. Sim*, 26. Roseate Tern on the Norfolk Coast, *Right Hon. Lord Lilford*, 26. Storm Petrels in Yorkshire, *James Backhouse, jun.*, 27. Little Gull on the Mersey, *W. Bell*, 27. Great Grey Shrike in Yorkshire, *John H. Salter*, 27. Hoopoe in Shetland, *George Sim*, 27. Correction of Error, 27.

Fishes.—The Mackarel Season in Cornwall, *Thomas Cornish*, 27. Jersey Fishes, *John T. Carrington, F.L.S.*, 28. Flight of the Flying Fish, 28.

Arachnida.—Habits of the Tarentula, 29.

SCIENTIFIC SOCIETIES.

Linnean Society, 29. Zoological Society, 30. Entomological Society, 31.

NOTICES OF NEW BOOKS.

'Island Life; or the Phenomena and Causes of Insular Faunas and Floras, including a revision and attempted solution of the problem of Geological Climates, by Alfred Russel Wallace, 33.

'New Guinea: what I did and what I saw,' by L. M. D'Albertis, 36.

'Sir Andrew Smith's Miscellaneous Ornithological Papers, 1830–34,' 40.

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CONTENTS.

The Annals of Irish Zoology, *The Editor*, 473.

Ornithological Notes from East Norfolk, *J. H. Gurney, Jun., F.Z.S.*, 484.

OCCASIONAL NOTES.

Birds.—Iceland Falcon in Ireland, *A. G. More, F.L.S.*, 488. Ornithologica Notes from Salisbury, *Rev. A. P. Morres, M.A.*, 489. Habits of the Storm Petrel in Captivity, *Rev. Murray A. Mathew, M.A., F.L.S.*, 489. Petrels on the Lincolnshire Coast, *Charles Dixon*, 491. Rare Birds in Sussex *Rev. Thomas Parkin, M.A., F.Z.S.*, 491. Song of the Woodchat Shrike *Hugh A. Macpherson*, 492. Birds and Telegraph-wires, *J. J. Armistead* 492. Osprey in Cornwall, *Thomas Cornish*, 493. Hobby nesting in Oxfordshire, *F. C. Aplin*, 493. Crested Lark in Sussex, *W. Borrer, M.A, F.L.S.*, 494. Jackdaw *versus* Chough in Kirkcudbrightshire, *J. J. Armistead*, 494. Glossy Ibis in Hampshire, *Rev. Richard Hooper, M.A.*, 494. Early Appearance of the Great Grey Shrike, *Charles Dixon*, 494. Honey Buzzard in Hertfordshire, *J. A. Ewing*, 495.

NOTICES OF NEW BOOKS.

'The Formation of Vegetable Mould through the action of Worms; with Observations on their Habits,' by Charles Darwin, LL.D., F.R.S., 495.

'Studies in the Theory of Descent,' by Dr. A. Weismann; translated and edited by Raphael Meldola, F.C.S., 499.

'The Spiders of Dorset; with an Appendix containing short Descriptions of those not yet found in Dorsetshire,' by the Rev. Octavius Pickard Cambridge, M.A., C.M.Z.S.; edited by Prof. J. Buckman, F.G.S., F.L.S. (vol. ii.), 500.

'Some more Scraps about Birds,' by Charles Murray Adamson, 501.

'A Manual of Injurious Insects; with Methods of Prevention and Remedy for their attacks on Food Crops, Forest Trees, and Fruit; with a short Introduction to Entomology,' by Eleanor A. Ormerod, 502.

'A Zoological Atlas (including Comparative Anatomy); with Practical Directions and Explanatory Text,' by D. M'Alpine, F.C.S., 504.

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